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59/

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.S): G4A[UXF]

Int CI (Ed.7): G06F 17/60

Other: ONLINE: EPOQUE, INTERNET.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	JP 2000137757 A [Fumiko KK, Sakuzoo KK] See abstract and Figs ? Showing stock displays	1, 8, 9, 15
X	US 5,930,763 A [Toyoto Jidosha KK] See abstract and references to forecasting stocks.	"
A	GB 2 346 227 A [Gardner, R. F.	"

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

PATENT ABSTRACTS OF JAPAN

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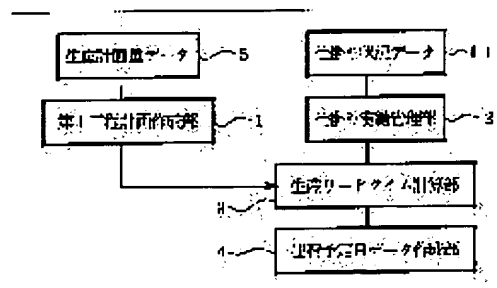
(21)Application number : **09-335737** (71)Applicant : **SEKISUI CHEM CO LTD**
 (22)Date of filing : **05.12.1997** (72)Inventor : **HARADA YUKIHIKO**

(54) SHIPMENT SCHEDULE SIMULATION SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an accurate scheduled date for shipment.

SOLUTION: The system is provided with a 1st process plan preparation part 1 for drafting a working plan for a 1st process in a plant, a works-in- process(WIP) actual state management part 2 for managing current WIP number data after a 2nd process or post process progress data, a production lead time calculation part 3 for calculating a production lead time by considering the waiting time for every process, working time and workable time band obtained by the preparation part 1 and the management part 2, and a shipment scheduled date data preparation part 4 for calculating shipment timing based on the production lead time obtained by the calculation part 3 and the operation state of a carrying vehicle.



LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] The first process-planning creation section which forms the processing plan of the first process in works, The present condition after the second process begins, and lot number data and back process progress data are managed, and are begun. The management-by-results section, The production calculating lead time section which calculates a production lead time in consideration of said first process-planning creation section, or said processing latency time for each [which began and was obtained by the management-by-results section] process of every, floor to floor time and a processible time zone, The shipment schedule simulation system characterized by having said production lead time obtained in this production calculating lead time section, and the shipping time data origination section which calculates shipment timing according to the operation situation of a conveyance car.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the shipment schedule simulation system which enabled it to obtain in more detail the shipping time when precision is high about a shipment schedule simulation system.

[0002]

[Description of the Prior Art] At works, the product is usually produced through many processes. Thus, it may be necessary to connect the time for delivery (shipping time) to a customer to the product currently produced through many processes at works.

[0003] The product calculates the time amount started by production of the first process by making an operation sheet, the shipping time of a product adds the standard lead time which the back process after the second process beforehand set as this takes, and he was trying to search for it conventionally.

[0004] For example, at the molding process, by the packing process, the second process was computed for it by the formula of + fixed value two days at shipping time at the time of the shipping time = first process termination scheduled day, supposing the first process had set the standard lead time which the third process is shipment and the back process after the second process takes as the fixed value of two days.

[0005]

[Problem(s) to be Solved by the Invention] However, according to how to ask for the above-mentioned shipping time, are making into the fixed value standard lead time which the back process after the second process takes, but Since fluctuation produces the back process after the second process in fact under the effect of the processible time zone concerning the day of the week of the difference of the processing latency time which it begins and is produced according to a situation, and the floor to floor time by the difference in a production form, a weekday, a weekend, etc., etc., or the difference in time etc., After calculating standard lead time uniformly as a fixed value, there was a problem that only the shipping time when precision is low was obtained.

[0006] This invention aims at offering the shipment schedule simulation system which enabled it to obtain the shipping time when precision is high in view of the above-mentioned actual condition.

[0007]

[Means for Solving the Problem] The first process-planning creation section which forms the processing plan of the first process [this invention] in works, The present condition after the second process begins, and lot number data and back process progress data are managed, and are begun. The management-by-results section, The production calculating lead time section which calculates a production lead time in consideration of said first process-planning creation section, or said processing latency time for each [which began and was obtained by

the management-by-results section] process of every, floor to floor time and a processible time zone, It is considering as the shipment schedule simulation system characterized by having said production lead time obtained in this production calculating lead time section, and the shipping time data origination section which calculates shipment timing according to the operation situation of a conveyance car.

[0008] According to the above-mentioned means, the following operations are acquired.

[0009] In the first process-planning creation section, while forming the processing plan of the first process in works It begins, the present condition after the second process begins in the management-by-results section, and lot number data and back process progress data are managed. In the production calculating lead time section In consideration of said first process-planning creation section, or said processing latency time for each [which began and was obtained by the management-by-results section] process of every, floor to floor time and a processible time zone, the production lead time when precision is high is calculated. In the shipping time data origination section It enables it to obtain the shipping time when precision is high by calculating shipment timing according to the operation situation of a production lead time and a conveyance car acquired in the production calculating lead time section.

[0010]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with the example of illustration.

[0011] The block diagram of the first process-planning creation section of drawing 1 begins the whole block diagram and drawing 2 which drawing 1 requires for an example of the gestalt of operation of this invention, drawing 1 begins drawing 3 , and the block diagram of the management-by-results section and drawing 4 are the block diagrams of the production calculating lead time section of drawing 1 R> 1. Moreover, drawing 5 is the image Fig. of the fictitious production line assumed in order to explain this invention concretely.

[0012] As shown in drawing 1 , with the first process-planning creation section 1, the shipment schedule simulation system of this invention is begun, and is constituted by the management-by-results section 2, the production calculating lead time section 3, and the shipping time data origination section 4.

[0013] Among these, first, said first process-planning creation section 1 is equipped with the first process Planning Department 7 which creates the first process-planning data 6 based on the inputted amount data 5 of production planning, and the first process master 6 created beforehand, as shown in drawing 2 .

[0014] Here, said amount data 5 of production planning are a production initial complement according to lot number of a product (quantity), and data with which production priority (there is also a case of a priority or time for delivery) etc. was registered.

[0015] Moreover, said first process masters 6 are the lot number tree and lot number tact time (time amount required to produce one piece) of a processing machine, and the database with which the count of stage replacement constraint etc. was registered.

[0016] And from the production initial complement of said amount data 5 of production planning, and the lot number tact time of said first process master 6, said first process Planning Department 7 calculates the processing initiation predetermined time and processing termination predetermined time of the first process, and creates the first process-planning data 7.

[0017] Under the present circumstances, said first process Planning Department 8 can correct count now based on the count of stage replacement constraint etc.

[0018] Next, it began from said management-by-results computer of the manufacture site which is not illustrated as the management-by-results section 2 is shown in drawing 3 by beginning, the lot number data 9, the back process progress data 10, etc. began, the situation data 11 were collected, and it has the initial condition creation processing section 13 for

simulation which creates the simulation initial condition data 12 which serve as an index of the processing latency time from these.

[0019] It begins. next, said production calculating lead time section 3 is shown in drawing 4 -- as -- said -- with the simulation initial condition data 12 from the management-by-results section 2 Collect the first process-planning data 7 from said first process-planning creation section 1, and the masters 14 for simulation given beforehand, and the simulation activation database 15 is made. Based on the simulation activation database 15, it has the initiation termination predetermined-time count section 17 classified by [classified by lot number] process which creates the production termination predetermined-time data 16 classified by lot number, making full use of the Rhine simulator which is production calculating lead time software.

[0020] Here, said master 14 for simulation is the database with which data peculiar to a lot number, the terms and conditions of a facility, etc. were registered.

[0021] Finally, said shipping time data origination section 4 calculates shipment timing according to the operation situation of the production termination predetermined-time data 16 classified by lot number, and conveyance cars, such as a truck.

[0022] In addition, 18 are a No. 1 briquetting machine and products (or half-finished products etc.) with which as for a No. 1 baler and 21 a No. 2 baler and 22 require conveyance cars, such as a truck, and 23-28 require [19] an unfinished product place and 20 for processing among drawing 5.

[0023] Moreover, let time amount which from the molding process which is the first process before shipment takes be a production lead time in this case.

[0024] Next, actuation is explained.

[0025] First, in said first process-planning creation section 1 shown in drawing 2, from the production initial complement of said inputted amount data 5 of production planning, and the lot number tact time of said first process master 6 registered beforehand, said first process Planning Department 8 calculates the processing initiation predetermined time and processing termination predetermined time of the first process, and creates the first process-planning data 7.

[0026] Under the present circumstances, since the count of stage exchange of constraint of a machine processible [with the lot number of a product] and the machine which is not made and the day of a machine may have constraint, said first process Planning Department 8 corrects count based on the count of stage replacement constraint etc. For example, in the case of drawing 5, the first process-planning data 7 as shown in Table 1 are created.

[0027]

[Table 1]

①成型工程計画データ

品番	成型開始予定	成型終了予定	成型機	優先度	数量
A001	9/1 10:00	9/1 13:00	1号機	1	1000
B002	9/1 13:00	9/1 13:30	1号機	2	500

Next, it begins from said management-by-results computer of the manufacture site which the initial condition creation processing section 13 for simulation does not illustrate in the management-by-results section 2 by beginning shown in drawing 3, the lot number data 9, the back process progress data 10, etc. begin, the situation data 11 are collected, and the simulation initial condition data 12 which serve as an index of the processing latency time from these are created. For example, in the case of drawing 5, the simulation initial condition data 12 as shown in table 2 and Table 3 are created.

[0028]

[Table 2]

(仕掛け品データ)

品番	生産数量	梱包機	待ち行列順位
E005	500	1号機	1
F006	300	2号機	2

[Table 3]

(梱包工程データ)

品番	残数量	梱包機
C003	500	1号機
D004	300	2号機

Next, in said production calculating lead time section 3 shown in drawing 4, the initiation termination predetermined-time count section 17 classified by [classified by lot number] process processes like below.

[0029] That is, said initial condition data of each process [in / it begins and / the back process after / the simulation initial condition data 12 from the management-by-results section 2 to / the second process] (in the case of drawing 5, they are ***** and a packing process) are incorporated.

[0030] Moreover, the data of the order of processing according to processing opportunity of the first process are incorporated from the first process-planning data 7 from said first process-planning creation section 1. For example, in the case of drawing 5, data as shown in Table 4 are incorporated.

[0031]

[Table 4]

(インプットデータ)

成型機番号	成型順	品番	数量
1号機	1	A001	1000
1号機	2	B002	500

Furthermore, data peculiar to a lot number, the terms and conditions of a facility, etc. are beforehand registered into said master 14 for simulation. For example, in the case of drawing 5, data as shown in table 5 and Table 6 are registered.

[0032]

[Table 5]

(品番特有データ)

品番	梱包可能梱包機番号	梱包タクトタイム
A001	1号機、	2分/100個
B002	2号機	3分/100個

[Table 6]

(設備の諸条件)

設備名	稼働時間
梱包1号機	24時間稼働
梱包2号機	8:00~14:00

It begins. and the initiation termination predetermined-time count section 17 classified by [classified by lot number] process -- said -- with the simulation initial condition data 12 from the management-by-results section 2 Full use of the Rhine simulator which is production calculating lead time software is made the first process-planning data 7 from said first process-planning creation section 1, and based on said master 14 for simulation. First, the processing initiation predetermined time and processing termination predetermined time (floor to floor time) of a product (the case of drawing 5 products 25-28) for every process in the simulation initial condition data 12 are calculated. For example, in the case of drawing 5, a processing initiation predetermined time and a processing termination predetermined time as shown in

Table 7 are acquired.

[0033]

[Table 7]

品番	成型 号機	成形 開始予定	成形 終了予定	梱包 号機	梱包 開始予定	梱包 終了予定
C003				1	9/1 10:00	9/1 13:00
D004				2	9/1 10:00	9/1 12:00
E005				1	9/1 13:00	9/1 15:00
F006				2	9/1 12:00	9/1 14:00

As for the products 25 and 26 concerning the lot numbers C003 and D004 which are already in a packing process, in the case of Table 7, a packing termination predetermined time is calculated from a packing required number, respectively. Moreover, about the products 25 and 26 concerning the lot numbers E005 and F006 on the unfinished product place 19, after the balers 20 and 21 which can be packed up, respectively are vacant, it will be packed up according to queue ranking and the packing initiation predetermined time and packing termination predetermined time at that time are calculated.

[0034] Next, the initiation termination predetermined-time count section 17 classified by [classified by lot number] process calculates the processing initiation predetermined time and processing termination predetermined time (floor to floor time) for every process of a product (the case of drawing 5 products 23 and 24) which are in the first process-planning data 7 from said first process-planning creation section 1. Under the present circumstances, count is corrected in consideration of data peculiar to the lot number in said master 14 for simulation, the terms and conditions (processable time zone) of a facility, etc. For example, in the case of drawing 5, a processing initiation predetermined time and a processing termination predetermined time as shown in Table 8 are acquired.

[0035]

[Table 8]

品番	成型 号機	成形 開始予定	成形 終了予定	梱包 号機	梱包 開始予定	梱包 終了予定
A001	1	9/1 10:00	9/1 13:00	1	9/1 15:00	9/1 15:20
B002	1	9/1 13:00	9/1 13:30	2	9/2 8:00	9/2 8:15

Although molding is completed to 9/1 of 13:30, since the product 26 concerning F006 is applied to 14:00, and since the No. 2 baler 21 has the terms and conditions of facility of working only from 8:00 to 14:00, the No. 2 baler 21 cannot pack up the product 24 which is applied to a lot number B002 in the case of Table 8 within the day. As a result, the packing initiation predetermined time of the product 24 concerning a lot number B002 consists of 9/2 of 8:00.

[0036] As the above-mentioned result, the production termination predetermined-time data 16 classified by lot number are obtained. In the case of drawing 5, the production termination predetermined-time data 16 classified by lot number become with a thing as shown in Table 9. That is, the production termination predetermined-time data 16 classified by lot number are equivalent to the packing termination predetermined time of Table 8.

[0037]

[Table 9]

品番	生産終了 予定時間	数量
A001	9/1 15:20	1000
B002	9/2 8:15	500

Finally, said shipping time data origination section 4 calculates shipment timing according to the operation situation of the production termination predetermined-time data 16 classified by lot number, and the conveyance cars 22, such as a truck. For example, in the case of drawing 5, it becomes with a thing as shown in Table 10.

[0038]

[Table 10]

品番	出荷予定日	数量
A001	9/2 15:00	1000
B002	9/2 15:00	500

If the conveyance cars 22, such as a truck, shall leave for 15:00 every day in the case of Table 10, since a packing termination predetermined time is 15:20, the product 23 concerning a lot number A001 cannot be shipped within the day, but will be set to 9/2 of 15:00.

[0039] Thus, since according to this invention the simulation initial condition data 12 in each present process which begin, collect the situation data 11 from the management-by-results computer of a manufacture site, and serve as an index of the processing latency time are created, the processing latency time, floor to floor time, and a processible time zone are added, making full use of the Rhine simulator which is production calculating lead time software and the production lead time was calculated, the shipping time when precision is high can be obtained.

[0040] In addition, as for this invention, it is needless to say that modification can be variously added within limits which are not limited only to the gestalt of above-mentioned operation and do not deviate from the summary of this invention.

[0041]

[Effect of the Invention] As explained above, according to the shipment schedule simulation system of this invention, the outstanding effectiveness that the shipping time when precision is high can be obtained can be done so.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the shipment schedule simulation system which enabled it to obtain in more detail the shipping time when precision is high about a shipment schedule simulation system.

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PRIOR ART

[Description of the Prior Art] At works, the product is usually produced through many processes. Thus, it may be necessary to connect the time for delivery (shipping time) to a customer to the product currently produced through many processes at works.

[0003] The product calculates the time amount started by production of the first process by making an operation sheet, the shipping time of a product adds the standard lead time which the back process after the second process beforehand set as this takes, and he was trying to search for it conventionally.

[0004] For example, at the molding process, by the packing process, the second process was computed for it by the formula of + fixed value two days at shipping time at the time of the shipping time = first process termination scheduled day, supposing the first process had set the standard lead time which the third process is shipment and the back process after the second process takes as the fixed value of two days.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to the shipment schedule simulation system of this invention, the outstanding effectiveness that the shipping time when precision is high can be obtained can be done so.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, according to how to ask for the above-mentioned shipping time, are making into the fixed value standard lead time which the back process after the second process takes, but Since fluctuation produces the back process after the second process in fact under the effect of the processible time zone concerning the day of the week of the difference of the processing latency time which it begins and is produced according to a situation, and the floor to floor time by the difference in a production form, a weekday, a weekend, etc., etc., or the difference in time etc., After calculating standard lead time uniformly as a fixed value, there was a problem that only the shipping time when precision is low was obtained.

[0006] This invention aims at offering the shipment schedule simulation system which enabled it to obtain the shipping time when precision is high in view of the above-mentioned actual condition.

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MEANS

[Means for Solving the Problem] The first process-planning creation section which forms the processing plan of the first process [this invention] in works, The present condition after the second process begins, and lot number data and back process progress data are managed, and are begun. The management-by-results section, The production calculating lead time section which calculates a production lead time in consideration of said first process-planning creation section, or said processing latency time for each [which began and was obtained by the management-by-results section] process of every, floor to floor time and a processible time zone, It is considering as the shipment schedule simulation system characterized by having said production lead time obtained in this production calculating lead time section, and the shipping time data origination section which calculates shipment timing according to the operation situation of a conveyance car.

[0008] According to the above-mentioned means, the following operations are acquired.

[0009] In the first process-planning creation section, while forming the processing plan of the first process in works It begins, the present condition after the second process begins in the management-by-results section, and lot number data and back process progress data are managed. In the production calculating lead time section

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a whole block diagram concerning an example of the gestalt of operation of this invention.

[Drawing 2] It is the block diagram of the first process-planning creation section in drawing 1 .

[Drawing 3] it can set to drawing 1 -- it begins and is the block diagram of the management-by-results section.

[Drawing 4] It is the block diagram of the production calculating lead time section in drawing 1 .

[Drawing 5] It is the image Fig. of the fictitious production line assumed in order to explain this invention concretely.

[Description of Notations]

- 1 First Process-Planning Creation Section
- 2 Begin and it is Management-by-Results Section.
- 3 Production Calculating Lead Time Section
- 4 Shipping Time Data Origination Section
- 5 The Amount Data of Production Planning
- 9 Begin and it is Lot Number Data.
- 10 Back Process Progress Data
- 22 Conveyance Car

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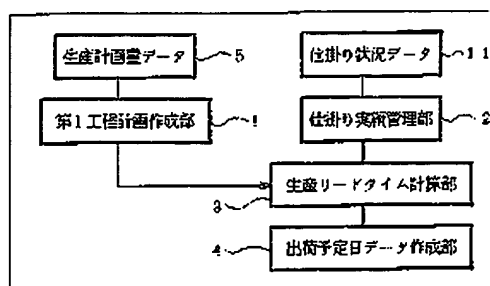
積水化学工業株式会社内

(54) 【発明の名称】 出荷予定シミュレーションシステム

(57) 【要約】

【課題】 精度の高い出荷予定日を得ることができるようにする。

【解決手段】 工場内の第一工程の加工計画を立てる第一工程計画作成部1と、第二工程以降の現状の仕掛り品番データや後工程進捗データを管理する仕掛り実績管理部2と、前記第一工程計画作成部1や前記仕掛り実績管理部2によって得られた各工程ごとの加工待ち時間と加工時間と加工可能時間帯とを考慮して生産リードタイムを計算する前記生産リードタイム計算部3と、該生産リードタイム計算部3で得られた生産リードタイムと搬送車両の運行状況によって出荷タイミングを計算する出荷予定日データ作成部4とを備えるようにしている。



(2)

特開平11-175636

1

2

【特許請求の範囲】

【請求項1】 工場内における第一工程の加工計画を立てる第一工程計画作成部と、

第二工程以降の現状の仕掛り品番データや後工程進捗データを管理する仕掛り実績管理部と、

前記第一工程計画作成部や前記仕掛り実績管理部によって得られた各工程ごとの加工待ち時間と加工時間と加工可能時間帯とを考慮して生産リードタイムを計算する生産リードタイム計算部と、

該生産リードタイム計算部で得られた前記生産リードタイムと搬送車両の運行状況によって出荷タイミングを計算する出荷予定日データ作成部とを備えたことを特徴とする出荷予定シミュレーションシステム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、出荷予定シミュレーションシステムに関するものであり、より詳しくは、精度の高い出荷予定日を得ることができるようにした出荷予定シミュレーションシステムに関するものである。

【0002】

【従来の技術】工場などでは、通常、多くの工程を経て製品が生産されている。このように、工場で多くの工程を経て生産されている製品に対し、その納期（出荷予定日）を、顧客へ連絡する必要が生じる場合がある。

【0003】従来、製品の出荷予定日は、その製品が第一工程の生産に着手される時間を工程表を作るなどして計算し、これに予め設定しておいた第二工程以降の後工程に要する標準リードタイムを加算して求めるようにしていた。

【0004】例えば、第一工程が成型工程で、第二工程が組包工程で、第三工程が出荷であり、第二工程以降の後工程に要する標準リードタイムを2日という固定値に設定していたとすると、出荷予定日＝第一工程終了予定日時＋固定値2日という計算式によって出荷予定日は算出されていた。

【0005】

【発明が解決しようとする課題】しかしながら、上記した出荷予定日の求め方によれば、第二工程以降の後工程に要する標準リードタイムを固定値としているが、実際には、第二工程以降の後工程は、仕掛り状況によって生じる加工待ち時間や、生産品種の違いによる加工時間の差や、週日か週末かなどの曜日や日時の違いにかかる加工可能時間帯などの影響により変動が生じるため、標準リードタイムを固定値として一律に計算してしまうと、精度の低い出荷予定日しか得られないという問題があった。

【0006】本発明は、上述の実情に鑑み、精度の高い出荷予定日を得ることができるようにした出荷予定シミュレーションシステムを提供することを目的とするものである。

【0007】

【課題を解決するための手段】本発明は、工場内における第一工程の加工計画を立てる第一工程計画作成部と、第二工程以降の現状の仕掛り品番データや後工程進捗データを管理する仕掛り実績管理部と、前記第一工程計画作成部や前記仕掛り実績管理部によって得られた各工程ごとの加工待ち時間と加工時間と加工可能時間帯とを考慮して生産リードタイムを計算する生産リードタイム計算部と、該生産リードタイム計算部で得られた前記生産リードタイムと搬送車両の運行状況によって出荷タイミングを計算する出荷予定日データ作成部とを備えたことを特徴とする出荷予定シミュレーションシステムとしている。

【0008】上記手段によれば、以下のような作用が得られる。

【0009】第一工程計画作成部で、工場内の第一工程の加工計画を立てると共に、仕掛り実績管理部で、第二工程以降の現状の仕掛り品番データや後工程進捗データを管理し、生産リードタイム計算部で、前記第一工程計画作成部や前記仕掛り実績管理部によって得られた各工程ごとの加工待ち時間と加工時間と加工可能時間帯とを考慮して精度の高い生産リードタイムを計算し、出荷予定日データ作成部で、生産リードタイム計算部で得られた生産リードタイムと搬送車両の運行状況によって出荷タイミングを計算することにより、精度の高い出荷予定日を得られるようにしている。

【0010】

【発明の実施の形態】以下、本発明の実施の形態を、図示例と共に説明する。

【0011】図1は本発明の実施の形態の一例にかかる全体構成図、図2は図1の第一工程計画作成部の構成図、図3は図1の仕掛り実績管理部の構成図、図4は図1の生産リードタイム計算部の構成図である。又、図5は、本発明を具体的に説明するために想定した架空の生産ラインのイメージ図である。

【0012】本発明の出荷予定シミュレーションシステムは、図1に示すように、第一工程計画作成部1と、仕掛り実績管理部2と、生産リードタイム計算部3と、出荷予定日データ作成部4とによって構成されている。

【0013】このうちまず、前記第一工程計画作成部1は、図2に示すように、入力された生産計画データ5と、予め作成された第一工程マスター6とに基づき、第一工程計画データ6を作成する第一工程計画部7を備えている。

【0014】ここで、前記生産計画データ5は、製品の品番別の生産必要量（数量）や、生産優先順位（優先度、或いは、納期の場合もある）などが登録されたデータである。

【0015】又、前記第一工程マスター6は、加工機の種類や、品番タクトタイム（1個生産するのに必

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要な時間)や、段取替制約回数などが登録されたデータベースである。

【0016】そして、前記第一工程計画部7は、前記生産計画データ5の生産必要量と、前記第一工程マスター6の品番タクトタイムから、第一工程の加工開始予定時間と加工終了予定時間を計算して第一工程計画データ7を作成するようになっている。

【0017】この際、前記第一工程計画部8は、段取替制約回数などに基づいて、計算を修正し得るようになっている。

【0018】次に、前記仕掛り実績管理部2は、図3に示すように、図示しない製造現場の実績管理コンピュータから仕掛り品番データ9や後工程進捗データ10などの仕掛り状況データ11を収集し、これらから加工待ち時間の指標となるシミュレーション初期条件データ12を作成するシミュレーション用初期条件作成処理部13を備えている。

【0019】次に、前記生産リードタイム計算部3は、図4に示すように、前記仕掛り実績管理部2からのシミュレーション初期条件データ12と、前記第一工程計画作成部1からの第一工程計画データ7と、予め与えられたシミュレーション用マスター14とを収集してシミュレーション実行データベース15を作り出し、シミュレーション実行データベース15に基づき、生産リードタイム計算ソフトであるラインシミュレータを駆使して、品番別生産終了予定時間データ16を作成する品番別工程別開始終了予定時間計算部17を備えている。

【0020】ここで、前記シミュレーション用マスター*

①成型工程計画データ

品番	成型開始予定	成型終了予定	成型機	搬入区	搬出区
A001	9/1 10:00	9/1 13:00	1号機	1	1000
B002	9/1 13:00	9/1 13:30	1号機	2	500

次に、図3に示す前記仕掛り実績管理部2では、シミュレーション用初期条件作成処理部13が、図示しない製造現場の実績管理コンピュータから仕掛り品番データ9や後工程進捗データ10などの仕掛り状況データ11を収集し、これらから加工待ち時間の指標となるシミュレーション初期条件データ12を作成する。例えば、図5の場合には、表2・表3に示すようなシミュレーション初期条件データ12が作成される。

【0028】

【表2】

(仕掛り品データ)

品番	生産設備	梱包機	待ち行列順位
E005	500	1号機	1
F006	300	2号機	2

【表3】

*14は、品番に特有のデータや設備の諸条件などが登録されたデータベースである。

【0021】最後に、前記出荷予定日データ作成部4

は、品番別生産終了予定時間データ16と、トラックなどの搬送車両の運行状況によって出荷タイミングを計算するようにしたものである。

【0022】なお、図5中、18は1号成型機、19は仕掛品置場、20は1号梱包機、21は2号梱包機、22はトラックなどの搬送車両、23～28は加工にかかる製品(又は半製品など)である。

【0023】又、第一工程である成型工程から出荷までの間に要する時間を、この場合の生産リードタイムとする。

【0024】次に、作動について説明する。

【0025】先ず、図2に示す前記第一工程計画作成部1では、前記第一工程計画部8が、入力された前記生産計画データ5の生産必要量と、予め登録された前記第一工程マスター6の品番タクトタイムから、第一工程の加工開始予定時間と加工終了予定時間を計算して第一工程計画データ7を作成する。

【0026】この際、製品の品番によって加工できる機械とできない機械の制約や、機械の一日の段取替回数に制約がある場合があるので、前記第一工程計画部8は、段取替制約回数などに基づいて、計算を修正する。例えば、図5の場合には、表1に示すような第一工程計画データ7が作成される。

【0027】

【表1】

(梱包工程データ)

品番	積数量	梱包機
C003	500	1号機
D004	300	2号機

次に、図4に示す前記生産リードタイム計算部3では、品番別工程別開始終了予定時間計算部17が以下のように処理を行う。

【0029】即ち、前記仕掛り実績管理部2からのシミュレーション初期条件データ12から、第二工程以降の後工程における各工程(図5の場合には、仕掛りと梱包工程)の初期条件データが取込まれる。

【0030】又、前記第一工程計画作成部1からの第一工程計画データ7より、第一工程の加工機別の加工順のデータが取込まれる。例えば、図5の場合には、表4に示すようなデータが取込まれる。

【0031】

【表4】

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(インプットデータ)

成型機番号	成型順	品番	数量
1号機	1	A001	1000
1号機	2	B002	500

更に、前記シミュレーション用マスター14には、品番に特有のデータや設備の諸条件などが予め登録されている。例えば、図5の場合には、表5・表6に示すようなデータが登録されている。

【0032】

【表5】

(品番特有データ)

品番	梱包可能梱包機番号	梱包タクトタイム
A001	1号機	2分/100個
B002	2号機	3分/100個

【表6】

(設備の諸条件)

設備名	稼働時間
梱包1号機	24時間稼働
梱包2号機	8:00~14:00

*

品番	成型 号機	成型 開始予定	成型 終了予定	梱包 号機	梱包 開始予定	梱包 終了予定
C003				1	9/1 10:00	9/1 13:00
D004				2	9/1 10:00	9/1 12:00
E005				1	9/1 13:00	9/1 15:00
F006				2	9/1 12:00	9/1 14:00

表7の場合、既に梱包工程にある品番C003とD004にかかる製品25、26は、梱包必要数からそれぞれ梱包終了予定時間が計算される。又、仕掛品置場19にある品番E005とF006にかかる製品25、26については、それぞれ梱包できる梱包機20、21が空いてから、待ち行列順位に従って梱包されることとなり、そのときの梱包開始予定時間と梱包終了予定時間が計算される。

【0034】次に、品番別工程別開始終了予定時間計算部17が、前記第一工程計画作成部1からの第一工程計

品番	成型 号機	成型 開始予定	成型 終了予定	梱包 号機	梱包 開始予定	梱包 終了予定
A001	1	9/1 10:00	9/1 15:00	1	9/1 15:00	9/1 16:20
B002	1	9/1 13:00	9/1 15:20	2	9/2 8:00	9/2 8:15

表8の場合、品番B002にかかる製品24は、9/1の13:30に成型が終了するが、2号梱包機21は、F006にかかる製品26が14:00まで掛るため、又、2号梱包機21は、8:00~14:00までしか稼働しないという設備の諸条件があるため、その日のうちには梱包できない。結果として、品番B002にかかる製品24の梱包開始予定時間は、9/2の8:00からとなっている。

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*そして、品番別工程別開始終了予定時間計算部17が、前記仕掛り実装管理部2からのシミュレーション初期条件データ12と、前記第一工程計画作成部1からの第一工程計画データ7と、前記シミュレーション用マスター14を基に、生産リードタイム計算ソフトであるラインシミュレータを駆使して、先ず、シミュレーション初期条件データ12にある製品(図5の場合には、製品25~28)の各工程毎の加工開始予定時間と加工終了予定時間(加工時間)を計算する。例えば、図5の場合には、表7に示すような加工開始予定時間と加工終了予定時間が得られる。

【0033】

【表7】

*画データ7にある製品(図5の場合には、製品23、24)の各工程毎の加工開始予定時間と加工終了予定時間(加工時間)を計算する。この際、前記シミュレーション用マスター14内にある品番に特有のデータや設備の諸条件(加工可能時間帯)などを考慮して計算を修正する。例えば、図5の場合には、表8に示すような加工開始予定時間と加工終了予定時間が得られる。

【0035】

【表8】

【0036】上記の結果として、品番別生産終了予定時間データ16が得られる。品番別生産終了予定時間データ16は、例えば、図5の場合には、表9のようなものとなる。即ち、品番別生産終了予定時間データ16は、表8の梱包終了予定時間に相当する。

【0037】

【表9】

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品番	生産終了 予定時間	数量
A001	9/1 15:20	1000
B002	9/2 8:15	500

最後に、前記出荷予定日データ作成部4は、品番別生産終了予定時間データ16と、トラックなどの搬送車両22の運行状況によって出荷タイミングを計算する。例えば、図5の場合には、表10のようなものとなる。

【0038】

【表10】

品番	出荷予定日	数量
A001	9/2 15:00	1000
B002	9/2 15:00	500

表10の場合、トラックなどの搬送車両22が毎日15:00に出発するものとする、品番A001にかかる製品23は、梱包終了予定時間が15:20であるため、その日のうちには出荷できず、9/2の15:00になる。

【0039】このように本発明によれば、現在の各工程における仕掛り状況データ11を製造現場の実績管理コンピュータから収集して加工待ち時間の指標となるシミュレーション初期条件データ12を作成し、生産リードタイム計算ソフトであるラインシミュレータを駆使して、加工待ち時間と加工時間と加工可能時間帯を加算し、生産リードタイムを計算するようにしたので、精度の高い出荷予定日を得ることができる。

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*【0040】なお、本発明は、上述の実施の形態にのみ限定されるものではなく、本発明の要旨を逸脱しない範囲内において種々変更を加え得ることは勿論である。

【0041】

【発明の効果】以上説明したように、本発明の出荷予定シミュレーションシステムによれば、精度の高い出荷予定日を得ることができるという優れた効果を奏し得る。

【図面の簡単な説明】

【図1】本発明の実施の形態の一例にかかる全体構成図である。

【図2】図1における第一工程計画作成部の構成図である。

【図3】図1における仕掛り実績管理部の構成図である。

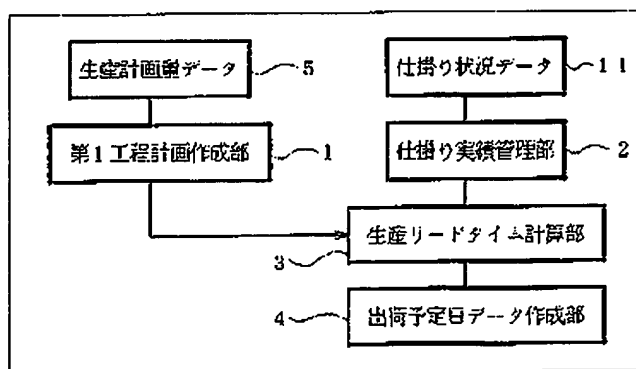
【図4】図1における生産リードタイム計算部の構成図である。

【図5】本発明を具体的に説明するために想定した架空の生産ラインのイメージ図である。

【符号の説明】

- 1 第一工程計画作成部
- 2 仕掛り実績管理部
- 3 生産リードタイム計算部
- 4 出荷予定日データ作成部
- 5 生産計画データ
- 9 仕掛り品番データ
- 10 後工程進捗データ
- 22 搬送車両

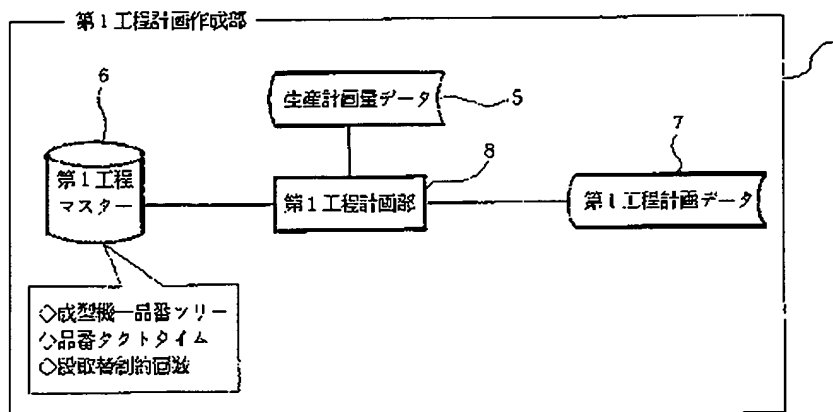
【図1】



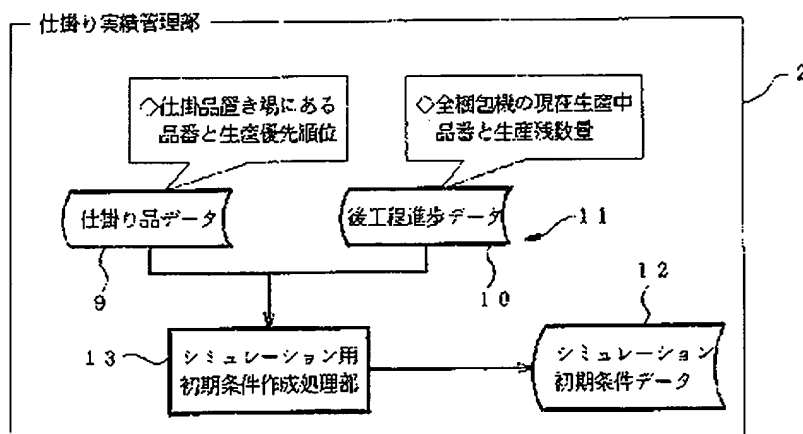
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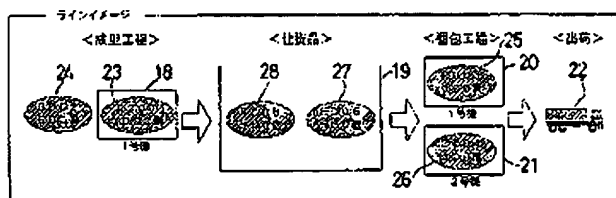
【図2】



【図3】



【図5】



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【図4】

